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N. A. C. A. BULLETIN

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Vol. XIII, No. 24 August 15, 1932

IN TWO SECTIONS

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This bulletin is published semi-monthly by the National Association of Cost Accountants, 1790 Broadway, New York. Subscription price $15.00 per year. Entered at the Post Office, New York, N. Y., as second class matter August 28, 1825, under the Act of March 3, 1879.

EDITORIAL DEPARTMENT NOTE

During the past three years much thought has been devoted to the subject of unemployment, and plans for the stabilization of labor and wages. Much has been said and written on the subject which has been instrumental in helping to bring about a considerable improvement in our economic conditions, which we think we can see at the present time. We are searching for plans which will tend to prevent or greatly alleviate the truly deplorable condition in which a great mass of our wage earners have found themselves during the period of general unemployment which we hope is now slowly but surely passing.

In this issue of our Bulletin we are presenting an article on the economic security of wage earners, which we think should be of interest to all our members.

The author of the first article, Mr. John R. Hall, is a graduate of the Hotchkiss School and of Yale University. He has been associated with the Bankers' Trust Company and then associated with Mr. Robert C. Pruyn. In 1908 he became connected with the Stock Exchange firm of Crawford, Patton & Cannon, then later with the banking firm of Messrs. Hallgarten & Company where he was intimately associated with financing, reorganizing and consolidating operations of nationally known companies. He represented the Investment Bankers' Association on its Railroad Committee during the war and was the author of several papers in connection with the co-ordination of all transportation facilities. During the summer of 1918 Mr. Hall became associated with Mr. George W. Perkins to help carry on the war work of the Y. M. C. A. in Europe. After the completion of this work he accepted a partnership in the firm of Knauth, Nachod & Kuhne. Since 1925 Mr. Hall has been associated in various capacities as financial and industrial counsel to American corporations. He has spoken at international conferences and before several of our chapters and has been a contributor of technical articles on personnel relations which have appeared in various publications. He is at present a director in a number of important industrial corporations, among which are Peyton-DuPont Company, Standard Stoker Company and others. Mr. Hall's paper was given before the Erie Chapter in May, 1932.

The second article in this issue of our Bulletin deals with a subject about which comparatively little has been written. It is certain that the indirect cost of fatigue among workers, which reveals itself in faulty workmanship, accidents, decreased production, etc., has not been generally recognized and the proper steps have not been taken to minimize it.

Mr. Harry W. Streck, the author of the second article, is a graduate of Bridgeport High School, International Correspondence School course in "Business Management," Vannais Accounting Institute and Pace Institute.

He was with the American & British Mfg. Company for three years as Chief Production Clerk in charge of all factory clerks. For two years he was with the Hatheway Mfg. Company where he installed the cost system and was in direct charge of the shipping, receiving, packing and stock rooms. For three years he was with Heppenstall Forge Company where he was Assistant to the Auditor, and for the past five years he has been in the office of the General Manager of Handy & Harman, refiners and dealers in precious metals, Bridgeport, Conn. He is a director of our Bridgeport Chapter.

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AUGUST 15, 1932

THE ECONOMIC SECURITY OF WAGE WORKERS—A PLAN FOR COORDINATING THE INTERESTS OF EMPLOYEES, EMPLOYERS, AND SOCIETY IN EMPLOYMENT STABILIZATION

By John R. Hall

Elements of Security

EXISTENCE includes certain primary physical hazards which are more or less certain to confront every individual at some time in his life in the form of a serious emergency. These primary hazards may be grouped into four general classifications; namely, temporary disability, permanent disability, death, and old age dependency.

To a considerable degree, the occurrence of these hazards is neither avoidable in point of fact nor predictable in point of time. Each may involve severe hardship to the individual and/or his dependents; a hardship which strikes in a two-fold manner entirely apart from and in addition to the mental or physical suffering and loss of self-respect and confidence which it may entail.

The incidence of any one of these hazards may not only deprive the individual, among other things, of income derived from wages gained by his labor but may also, and at the same time, heavily impair or completely absorb the reserve income or capital, or both, which he may have succeeded in accumulating from these wages by sacrifice, self-control and patient saving for many years.

While it may be impossible to prevent occurrence of any one of these contingencies, it is possible through adequate advance provision to mitigate, or avoid, the ill financial effects which follow in its wake. And to overcome, or to attempt to overcome, the ill financial effects of these risks in the case of the individual workers is to take the first step toward placing both the business and the social organization on a foundation capable of supporting a peaceful, advancing civilization.

Satisfactory methods and instrumentalities have been developed which enable us to overcome the injurious effects of each and every one of these primary physical hazards.

But largely by virtue of institutions which man himself has created, the vast majority of human beings are especially exposed

to danger from another hazard which grows more sinister in its varied aspects as science develops new products and processes of production and hastens the advent of change.

This hazard is that of unemployment.

The four primary physical hazards of existence—which fall peculiarly within the province of nature's workings—impose risks on every individual alike, not only on the worker, but also on the capitalist and on the proprietor who, however, are more or less in control of their own material well being. The hazard of unemployment, on the other hand, is especially disastrous to the man who works for wages—whose livelihood is dependent upon the thoughts and acts of capitalists and proprietors, upon factors over which the wage worker himself exercises little or no effective control.

As in the case of the primary physical hazards of life, so does unemployment (unless safeguarded) work with double strength on the well being of the wage worker to injure and destroy both his earning capacity and his financial reserves; but the effect of unemployment is much more devastating in that it tends to injure and destroy some of the most priceless of all man's possessions—his confidence in himself, his hope of attaining economic security in the future by his own efforts, and his loyalty to the social organization of which he is a unit.

The risk of unemployment seems to be more susceptible to control than are the primary hazards of life, even though at present it appears to be less predictable as to occurrence, extent, or duration, and more difficult to safeguard.

However, in spite of these conditions there are both methods and instrumentalities at hand by which protection from the fickle hazard of unemployment can be measurably assured to those dependent on wages.

Because all of the risks which I have mentioned are present in the life of a wage worker, and because each of them is capable by itself of exercising a disastrous influence on his economic life, the wage worker can attain certain economic security only by protecting himself from the ill financial effects, not of some of these hazards but of all of them.

Thus economic security for the wage worker requires a definite,

comprehensive financial program to cover all these hazards—and no one who is without such a program is economically secure.

The advantages of this protection to the individual, to society in general and to business are very evident. It benefits the individual by reducing actual suffering. It releases him in some degree from fear and worry of anticipated distress, thus tending to promote a healthier, happier state of mind which in itself reduces hazard. It removes one form of limitation and to that extent enables the individual to take better advantage of the opportunities which his circumstances may provide.

From a social standpoint, protection represents probably the least that could be expected from a civilized society, since even primitive societies have offered some measure of protection in caring for the helpless and aged. Full material security and full opportunity for the individual to advance mentally and spiritually may well constitute society's ideal. Science has made the attainment of this ideal actually possible to all for the first time in history.

From the standpoint of those who direct industry, that is, capital and management, the economic security of the worker is as important a consideration as any with which they have to deal. In the past this fact has received too little recognition. The worker has been looked upon, perhaps naturally, more as a factor of production than as a factor of consumption. Only in recent years have the first practical signs of a proper regard for the worker's place in relation to general prosperity and welfare come into view.

It is often truthfully said that "the consumer is king." In industry organized to the status of mass production, the worker is this consumer. Hence the necessity of providing him with a measure of economic security, or stability, in order that industry itself may be stabilized.

Human economic activity may be likened to a triangle, the three sides of which are production, distribution and consumption. The base upon which this triangle rests is consumption. Business leaders have in the past concentrated on two of the sides—production and distribution—whereas stability depends on the breadth and strength of the base—consumption—and this has been largely ignored.

Our hope for the future will depend on ability to make the base of the business triangle solid—on stability of consumption. And stabilized consumption, stabilized buying power, stabilized business, minimized cycles of alternate activity and stagnation, are contingent on individual stability. The worker is the logical point at which stabilizing activities must commence. The stability of the whole system proceeds no farther than the average stability of its component parts—on the ability of the system to re-establish its balance when the changes of circumstance and force bring need of the restoration of balance.

When it is thus recognized that economic security for the wage worker is a basic objective of industry, many otherwise confusing problems are brought into a clearer light. The procedure necessary to attain this objective is revealed as simpler and more easily grasped, and it becomes obvious that many of the influences and practices of the past have prevented this attainment and must be abandoned.

Necessity of Reserves

I have said that immunity from the primary physical hazards cannot be secured, but that a degree of immunity from their ill financial effects is obtainable. The financial effect of a contingency is impairment of earning power or current income, and this effect can be avoided only if another form of income is substituted to replace that which is lost. The only way by which this substitute income may be made available is through an advance provision which builds up capital reserves—reserves representing the results of past labor which are preserved or "canned" for future use. Without considering for the moment who holds responsibility for building up such reserves, it is evident that reserves are the sole means of providing for the economic security of the worker when he, for any reason, cannot exchange his services for compensation.

The use of reserves for maintaining capital facilities unimpaired against future contingencies is thoroughly understood and widely practiced. Every manufacturing concern must every year make allowance for the depreciation of its machinery, no matter whether the business makes profits or not. The allowance for depreciation, though nominally a reserve, is really a necessary expense of oper-

ation, being nothing more nor less than the inevitable cost of replacing the machine, distributed year by year over its estimated life. The business must make this expenditure if it is to continue in existence any longer than the life of its machines.

Similarly, there are other vicissitudes of the business which may threaten its existence unless further reserves are provided. The machine may be supplanted by newly invented machinery or for other reasons which render it relatively inefficient or obsolete; there may be enforced idleness of the machine through enocomic depression as at the present time; there may be labor troubles, fire losses, breakdowns, or a thousand other emergencies, some of which may be foreseen and others of which are wholly unforeseeable.

To equip a business enterprise to face the unknown, or even to face the fairly well understood cycles of business expansion and contraction, it must amass a real reserve fund, that is, a fund separate from and beyond requirements for its ordinary daily operations. The only possible source from which this fund can be derived is from the profits of the business. In years when the business makes no profits, the reserve fund is not added to, and may even be encroached upon. When profits are made, if the management is sagacious, these profits are not all distributed to the owners of business; part of them is retained and added to the reserve fund, which thus grows until it becomes of such a size as to enable the business to face with equanimity any contingency which human foresight can anticipate.

A business which set up no reserves would doubtless succumb to the first stroke of bad fortune; yet these same elementary principles apply to the case of the individual employee, and if he is not similarly provided with adequate reserve funds his continued activity is in just as precarious a position as that of the business without reserves. He needs, and must have, a fund separate from and beyond the requirements of his ordinary daily operations.

Sound business principles, applicable to the business itself are equally applicable to the individual employee. All of these risks may be safeguarded in a sound and businesslike way—death and disability by insurance, unemployment and superannuation by the accumulation of adequate reserves in the form of guaranteed annuities and suitable investments.

If business does not provide for the establishment of these reserves for the average worker, it leaves an extremely weak link in the industrial structure which at times may break with prodigious, threatening and even disastrous results to the well being of individuals, of business and of society as a whole.

Cost of Reserves

What does it cost to establish these necessary reserves? How much of a problem is involved in terms of the current earning power of the average worker? A few figures may help us to visualize this situation.

We will assume an average employee, 35 years of age, and with an annual income when fully employed of $1,600. Disregarding, for the time being, any apportionment of outlay between employee and employer, what is the total amount of the investment involved in providing necessary reserves against all of the primary hazards?

We can provide this worker with group life insurance paying $1,000 at death or when he is totally and permanently disabled, together with certain sickness and accident benefits paying $10 a week during temporary disability, for the annual sum of about $25. In addition, we can provide an ordinary life insurance policy paying another $1,000 at death for about $25 a year additional. And we can provide an annuity payable at age 65, equal to $1 per month for each year of service, for the sum of $62 per year. $112 a year, therefore, which is 7% of the worker's annual income, will provide a fair degree of protection against these hazards.

We have thus provided in some degree for all of the primary hazards except unemployment, and the question arises as to what reserve is necessary to meet this contingency. It is possible that, in case of unemployment, the employee might be able to reduce his current living expenses to one-half of the income he has received while working, that is, to the rate of $800 per year. In order to calculate the amount of the reserve at all, we must first make some such assumption. On the basis of this assumption, the next question is—what proportion of his time over a relatively long period will he be unemployed? Obviously, if the proportion of unemployment is zero, he will require no reserve at all. But if he is unemployed 10% of the time, it becomes necessary that a sum

equal to 5% of his earnings be set aside while he is working in order that it may provide for his current expenses, when he is not working, at the rate of $800 a year. If he is unemployed 20% of the time he must have a 10% reserve; if 50% of the time, a 25% reserve, and so on.

What reserve then does he really need? Obviously no one knows. The risk is incalculable. It is contingent on so many uncertain factors and its possible variation is of so wide a range that the most we can do is to provide as large a reserve as practicable.

I will refer to the problem of unemployment again at a later point in the discussion. For the present we will leave the cost of moderate reserves at 7% of income, plus an indeterminable amount to cover unemployment which should be as large as possible.

Responsibility for Reserves

Having pointed out the need of reserves and their approximate cost, the question now naturally arises as to who should bear the responsibility of providing them?

Is this a responsibility of the individual, of his immediate family, of charitable persons or institutions organized by benevolent members of society, or of the State? Obviously it may be the responsibility of any of these, depending on the character of the social organization in which the worker finds himself—in Germany, Russia, the U. S., or elsewhere.

It seems to me that in *our* social order the responsibility falls primarily on the individual worker. He and his dependents are the ones who suffer most acutely from failure to make adequate provision. The primary physical hazards of life do not arise by virtue of the employment or non-employment of the individual worker. They are inherent in existence and are not caused by any act of the employer or of society in general. Nature has placed man under the necessity of preserving his own life and that of his own dependents by his own efforts. Our society bases its practices, laws and institutions upon these requirements of nature, and all members of our society, therefore, naturally look to the individual as the responsible party.

But the question is, how in practice does this simple funda-

mental premise work out? In order that the worker may provide these reserves for himself, he must first of all possess, in an adequate degree, the individual qualities of foresight, knowledge and self-control. These are his own responsibilities from which no one can safely free him.

On the other hand, he also requires an adequate income in order to make possible the accumulation of any reserve at all. While the individual is held responsible for his own self-support he is dependent for this, at the same time, on wages, and wages depend to a very large extent, not on his own, but on another's determinations and acts. If society does not afford him adequate opportunity to discharge the responsibility it places on him, society itself may incur the necessity of discharging some part of that responsibility for him.

Even where the average worker does have some provision in the form of capital or income, as he often does, so that he is financially able temporarily to carry out at least a part of the provisions for his own protection, the significant fact of past experience is that, as a class, he does not do so. Early in life the primary hazards seem too remote; immediate prospects for indulgence and expenditure are too absorbing and attractive, while in advanced years the drain on income, which is necessary for adequate protection, becomes excessive or impossible to bear. In this respect experience shows that the average worker fails to exercise the necessary foresight, knowledge and self-denial effectively.

The responsibility is not discharged unless relatively early in his life the individual has the way marked out for him very plainly; unless he is induced to follow in that way; and unless he is given a considerable amount of very tangible help and encouragement. Because of this, organized effort on the part of employers or of society becomes necessary if these essential ends are to be accomplished.

Thus society may incur a double responsibility in this connection. First, it must provide an adequate income through employment and wages; second, it must provide organized effort to make more certain that the self-help thus made possible is really carried out.

If society, in this way, incurs a partial responsibility, may it not be neceessary that, as a practical expedient, it must assume the

entire responsibility? This question is of utmost importance in a discussion of this subject, for on the answer depends the whole matter of the economic unsoundness of paternalism.

If society discharges the individual's responsibility for him, it injures or destroys the individual by weakening his character. It atrophies his qualities of initiative, self-control, forethought, and responsibility in general by removing in some degree the necessity for exercising these qualities. The worker becomes parasitic, instead of self-reliant. If society destroys the character of its individual members, it destroys itself. Business cannot afford to permit the character of its wage workers to be weakened nor their buying power reduced, but must in the interest of its own preservation, perpetuation, and development, encourage its workers to strengthen their characters, increase their efficiency and earning power, and to spend their earnings wisely, partly for consumable goods and partly for capital goods in the form of income producing reserves.

These arguments could be developed in great detail and at great length but it is probably unnecessary to do so here. They are not only fully supported by common sense but by the past experience of those European and other states which have experimented so unsuccessfully with paternalistic systems of doles and other like benefits.

The entire responsibility for self-support must not be removed from the worker. Even from the standpoint of charity, the only justifiable charity is to help him to help himself. Inducement and education, not paternalism or compulsion, are required.

It makes a great difference in considering the subject of employee benefits as to what the employer thinks is his responsibility with respect to providing them for his employees. If he thinks he, as an employer, is responsible for protecting his employees from the ill effects of these hazards, he will believe, either from a sense of responsibility or from a sense of benevolence, that he alone must pay for this protection. I do not believe benevolence is a proper business motive, nor do I believe that the employer as such is responsible for protecting employees from hazards which he neither creates nor controls. I think the employer is primarily responsible to his stockholders; that the measures he establishes to protect employees are not, and should not be, for the purpose

of paying for loyalty, or for long service, or for satisfying benevolent impulses. They are to improve efficiency in order to stabilize and increase profits. Any other motive, in my opinion, is abortive and self-contradictory.

Current Practice

So far in the discussion we have considered the elements of hazard, the necessity for reserves, the cost of these reserves, and, in a general way, the responsibility for accumulating them. It should be next in order to consider how and to what extent these basic considerations are being carried out in current practice.

We will therefore discuss in sequence, current practice as it relates first, to life and disability coverage; second, to old age coverage; and third, to unemployment.

Life and Disability Coverage

The use of group insurance, covering life, health and accident, is fairly widespread. Reliable estimates indicate that probably 30% of industrial workers are so covered with an average policy of about $1,200. In over one-half of these it is estimated that the employer pays the entire outlay. Of the balance, a few plans are supported entirely by the employee, the rest by joint contributions, in various proportions, by both employer and employee.

In a detailed examination of the nature of this coverage, three facts stand out. First, the coverage is very inadequate so far as the total number of industrial workers is concerned, 30% being too low a proportion of the total. Second, even where employees are covered by group life insurance, this coverage, from the standpoint of protection, is far from adequate. Third, paternalism—gratuitous support by the employer—plays a large part.

These three facts are closely interconnected. The outlay for group insurance is relatively low, but the benefits accruing are correspondingly limited. The employer desirous of seeing his employees fully covered is faced with a difficult problem. Employees do not voluntarily contribute enough themselves to provide adequate coverage, while company support sufficient for this purpose is more of a burden than the employer usually thinks he can afford to pay. This burden, coming in good years as well as bad, when there are profits and when there are not, might con-

ceivably mean the undoing of the business, and this is especially true when benefits are increased as the length of service increases. It is an expense, moreover, from which the employer probably derives little, if any, direct and compensating return in increased profits due to increased efficiency of the workers. The worker receives his benefits equally whether he does his work well or poorly, provided only that he does it well enough to hold his job. The incentive exerted is merely passive in its influence on organization efficiency and production costs. Such benefits may restrain the worker from deliberately injuring company interests but they do not enlist him actively in its behalf. Each dollar of coverage so supplied therefore tends to place the company to that much disadvantage in competition with concerns who have not assumed this burden.

Our conclusion is that with isolated plans limited to group insurance protection, neither voluntary contribution by the employee, nor company contribution to the limit of permissible burden, will result in an adequate amount of coverage.

While in most cases group insurance appears to be essential, a more desirable form of protection than group insurance should be added, and it is available in the form of ordinary or whole life insurance. It is a more permanent form of coverage than group insurance in that it may be regarded as an investment and in that it may be made the worker's personal property not subject to loss with change of employer. The higher outlay involved has led employers generally to take comparatively little part either in providing such insurance gratuitously or in encouraging workers to procure such insurance voluntarily by their own contributions or by contributions made jointly by employer and employee. The greater outlay intensifies the difficulties already pointed out for group insurance.

At a later point we will develop what seems to us the most rational way for meeting these fundamental difficulties.

Old Age Coverage

Regarding old age coverage the use of pension plans is also fairly widespread. Estimates indicate that 40% of industrial workers are covered by plans under which they may receive pensions if specified requirements are met. The more important pro-

visions of the typical plan are found, on detailed study, to be approximately as follows:

First, a pension of modest amount, varying from $25 to $100 a month, commencing upon retirement at age 65 or 70, the exact amount in each case being dependent on (a) length of service and (b) average earnings during that service. (For example, a usual provision is for an annual pension equal to 1% of all earnings during employment or during a fixed number of years prior to retirement.

Second, this pension is made available only to employees who have been continuously in the company's service from 20 to 30 years or more.

Third, the outlay is usually borne entirely by the employer. (The majority of existing pension plans so provide although a large proportion of recent retirement plans have provided that the worker may or shall bear part of the outlay.)

Fourth, these pension rights are lost with termination of employment at any time prior to the retirement age.

Fifth, these pension rights do not represent a contractual relationship with the employee so that for a number of reasons not in the employee's control they may be withdrawn at any time, leaving him unprotected.

The practical difficulties in and objections to plans of this type have proved to be very formidable indeed. Not the least of these has been the financial burden involved and the practical certainty of ultimate insolvency and abandonment. In the first place, the funds required to cover the accruing liabilities are not capable of exact calculation because the actual pensions will be determined by the earning rates of the future which are currently unknown. In the second place, as reserves to cover pension liabilities under the plan are not usually provided for as the liabilities accrue or otherwise, pension disbursements will increase from year to year only reaching a steady and maximum level many decades after the commencement of the plan, and this only in the event that the number of employees wages or benefits are not increased in the meantime. At this time the disbursement will be ordinarily at least 15 times the disbursements of the first year, and even assuming no change in the number of employees nor in wages, can amount in total to 30% of the active payroll. No employer could

afford to carry a burden of such suicidal proportions even if he desired to do so, and the inevitable conclusion is that such plans, even those in which the pensions are already very inadequate, will have to be abandoned long before they reach the maximum disbursement period.

As in the case of life insurance, these expenditures will not have contributed materially to the efficiency of the business nor decreased the cost of production appreciably, if at all. The only incentive which such pensions seem to provide is to urge the worker to try to remain with the company until his abilities diminish and he must be retired.

During the hearings before a Subcommittee of the Committee of Manufacturers, United States Senate, last autumn, Mr. Gerard Swope, President of the General Electric Company, stated:

> "As I said before with regard to life insurance, the pensions were formerly given free by the company; and of course the men accepted them. It did not mean anything to them and they did not pay any attention to it; but the moment you ask a man to pay something for anything, he is going to make a more critical analysis of it."

The benefits the worker receives from gratuitous plans are not contingent on whether he does his work well or poorly, but only on whether he does his work well enough to hold his job until he arrives at retirement age. He has been relieved of taking thought for his own future, with its consequent inevitable deterioration of individual responsibility and character, by a promise. But he has no way of knowing that in all probability that promise will not and cannot be fulfilled. Thus the worker may find himself at 65 or 70, through no fault of his own, deprived of his anticipated pension for such reasons as failure of the company, lack of funds, forced change of employment, or even withdrawal of the plan.

Neither the motive of benevolence nor charity, nor the direct cash value of a large group of long service workers, can begin to compensate for the defects of such a plan.

However, it is to be noted that there is a growing and praiseworthy tendency to base retirement plans on annuities purchased currently from an insurance company, rather than on an unfunded pension promise. This annuity is an instrument which, if pur-

chased today, will definitely provide the worker with an element of income after he retires which he has earned by the year's service just past. If such an element of future income is purchased for continuing service with each succeeding year, his retirement income is not only assured but each year's liabilities are discharged as they accrue. Annuities placed with insurance companies are not only guaranteed as to principal and interest but are probably exceeded in safety by no other existing form of investment security.

It is my firm conviction that no plan can be worthy of consideration which does not fulfill two basic requirements: first, it must derive substantial support from the individual contributions of each worker, in order that he may have adequate coverage without loading an excessive burden on his employer. Second, it must be based on a system which provides for the discharge of the obligations created under it as fast as they accrue, thus remaining solvent from the outset.

From the standpoint of universal coverage, present plans are also open to the objection of inadequacy. In the first place, a gratuitous plan must presuppose a long service requirement in order to keep within reasonable bounds of outlay. The customary 25-year service clause is said to eliminate nearly 70% of the indigent aged from the possibility of pension benefits, at the same time discouraging the employment of workers who have already reached the age of 40 or 45, who are often the most efficient and, in other respects, the most desirable employees.

In the second place, there is again the problem, discussed under life insurance, of securing sufficient voluntary self-support where gratuitous support is not provided. These various factors will all be again considered at another place in our discussion.

Unemployment Coverage

On the whole there is no present coverage for unemployment, although a number of concerns are known to be making experiments in this direction. Present conditions have led to a wide discussion of this subject, particularly with relation to unemployment insurance. In this connection it should be pointed out that there can be, strictly speaking, no unemployment insurance since no actuarial basis exists for creating reserves to meet this risk. Unemployment insurance administered by the state is not

likely to be anything more nor less than a dole in the end—with all the abortive and detrimental results which that form of paternalism includes.

The danger, yes, the futility of relying on a state system or any other method of establishing economic security for the wage worker, other than one which is based on the possession by the individual worker himself of the resources which provide that security, was clearly disclosed by Mr. J. Pierpont Morgan in a recent radio address when he said in part:

> "During the present distress, and in face of the approaching exhaustion of both governmental and private funds for its relief, a new idea has been evolved," etc.

and when, in another part of this address, he stated:

> "We have reached a point where the aid of governments or the gifts of individuals, no matter how generous, are insufficient to meet the conditions which have come upon us."

It is my conviction that the most rational beginning to the solution of the unemployment hazard is to enable and induce workers to accumulate adequate individual reserves for themselves with which to meet this contingency.

Again, as in the other forms of coverage, there is the difficulty of inducing the worker to exert the neceessary wisdom and self-denial in his own behalf.

Defects Summarized

Thus the more important defects in present systems of protection, as I see them, may be very crudely summarized as follows:

First, paternalism—leading to excessive and unjustified economic burden of employers on the one hand, and to deterioration of the individual character and responsibility of employees on the other.

Second, technique—inadequate practical provisions and details leading to insufficient and uncertain coverage.

Third, incentive—inadequate incentive to invite self-provision at an early age when adequate provision is effectively possble at a minimum cost.

The most fundamental of these difficulties is the third, inadequate incentive, for technique is largely a matter of straight-

forward practical development, while all supposed necessity for paternalism is avoided where adequate incentive and opportunity to self-help is attained.

Adequate Incentive to Self-Protection

In examining the probable reasons for failure of employees generally to provide self-protection, let us first consider the bearing of age on the cost of this protection.

Unfortunately the average man does not become interested in provision for the future until he is 40, 45 or 50—until he has a growing family, has experienced the devastating effects of some of the unexpected vicissitudes of life, begins to feel the weight of dependence, and recognizes his own limitations and the limitations of his environment with respect to his prospects for the future. To the worker of 25 to 30, old age dependence and death seem very remote indeed. Even sickness and disability, at that age, are regarded with very little apprehension. Youth in its vigor, its confidence in itself, and its eagerness for adventure, quite naturally and yet unwisely, plans only for uninterrupted success and often looks upon the failures of those who have gone before as the result of obvious mistakes and forms of incompetence which do not appear on the map of life he draws for himself.

It is almost impossible to interest younger workers in self-provision against old age, death or even disability, if these forms of protection are presented as isolated proposals. Practical experience with this problem reveals only one rational solution; namely, a comprehensive plan embracing all phases of protection and including a contingent feature of especial attractiveness to younger workers.

Such a plan can be roughly outlined as follows:

First, group insurance and retirement annuities of very modest amount—reduced to the bare subsistence level—to which the employer will make a substantial contribution if the employee will volunteer to do likewise.

Second, provision for ordinary life and disability policies toward which voluntary contributions by employees are matched to a specified limit with contributions by the employer.

Third, provisions which enable the employee to increase the amount of his life insurance and annuities as he thinks best and to be paid for solely by himself.

Fourth, Provision for a savings and investment fund for employees, in which deposits of his savings are augmented by profit-sharing, and in which participation is conditional on the complete exercise of the foregoing options for minimum amounts of insurance and annuities.

Fifth, provision for a comprehensive system of employee education whereby principles and details of effective self-help and self-protection are constantly reiterated. This education, among other things, should also make clear and significant to him the principles and practices of business, particularly of that business in which he is engaged.

It is this fourth feature conditional participation in an investment fund and in profits very effectively meets the problem of incentive to younger workers. Real profit-sharing can be made to provide a very attractive inducement to all workers, young as well as old.

Savings and Investment Fund

Under this plan optional monthly deductions from wages would be placed in a trust fund and invested under suitable expert administration. A fixed and specified percentage of company profits would be added periodically to this fund as earned. Each depositor's share in the fund would remain distinct and would be reported to him periodically. Under these arrangements, the individual deposits would be augmented by (1) appreciation of the fund through investment; (2) additions from profits; and (3) accumulation at compound interest. With suitable restrictions to prevent manipulation, each depositor would be free to withdraw all funds to his credit at any time during employment or when employment is terminated.

By the miracle of compound interest it is readily possible for an average worker, during his working life, by small monthly contributions, moderate success in investment, and moderate sharing of profits, to have accumulated at 65, not only a suitable annuity, but also an estate of from $10,000 to $25,000. This, we maintain, is an extremely effective inducement, to the younger as

well as to the average worker, to make the necessary self-provision against all risks, to remain in the company's service and to exert maximum effort toward the general welfare of the company.

Experience shows that a comprehensive plan such as that outlined will insure wide adoption of the essential protective elements, yet at the same time will avoid paternalism, and increase individual self-reliance, self-denial and sense of individual responsibility. It may be designed to be effective practically and at the same time be economically sound and self-supporting. All of these features may be provided at a total investment by the employer which is generally less than the total annual cost of some of the typical unfunded plans which provide no benefits other than pensions. Moreover, the positive commitments, or the fixed charges, of the employer and employee are reduced to a very low minimum, while the maximum expenditures come during those periods when profits are largest and the additional outlay most readily met.

It is evident that the improvident employee who fails to take advantage of this opportunity for self-protection, fails to deserve any help whatever from his employer but must rely on general social provision for his needs which he will obtain in such manner as society determines.

More Stable Profits

In closing one more point may be considered. We have outlined an employee benefit plan in which the necessary incentive to self-help is provided by the investment and profit-sharing features. Profit-sharing is a major point, a key feature, in the operation of this plan. In order to secure the best possible effectiveness it is evident that there must be adequate profits to share.

Reserves for the depreciation of machinery or for meeting other business risks, cannot be accumulated without adequate profits. If the arguments of our discussion have been made clear it must be conceded that it is equally difficult to provide for the essential human reserves without the diversion of adequate profits to this purpose.

Even before the depression caused unprofitable operation to become generally accepted as more or less inevitable there was much discussion and protest in regard to inadequate profits. The term "profitless prosperity", it will be recalled, was in very common use.

Income tax statistics indicate that less than 25% of our industrial enterprises are really profitable even in the so-called prosperous years.

In some cases, but not all, unprofitable operation has been obviously due to mismanagement and inefficiency. But the conviction of many expert observers persists that much more of it is due to comparatively recent developments in the nature and intensity of unrestricted competition. In many industries real competitive advantage, in comparing the products of one manufacturer with those of another, has been reduced to almost negligible proportions by the wide dispersion of technical knowledge and by the diminishing returns of technical progress. In addition, surpluses of capital, labor, and equipment—all the facilities of production—have been accumulated to such an extent that large excess productive capacity is the rule.

The result has been an extremely intense competitive warfare, hinging on price and therefore tending to reduce price to bare subsistence levels, prominent characteristics of which have been excessive distribution cost and waste represented in duplication of facilities and excessive selling effort. In other words, competition has developed to an increasing degree a dual aspect. On the one hand is constructive competition which has compelled technical progress in design and in production efficiency to an unsurpassed degree. On the other hand is destructive competition which has induced excessive distribution cost and distribution waste.

It is becoming increasingly evident that a new concept of competition has become necessary, if not imperative. One is needed which legally and technically provides for a greater degree of coordination and effectiveness in distribution functions without at the same time sacrificing the present incentives to efficiency and progress in the production functions.

Adequate security for business or for workers can only be provided if there are adequate profits. And this fact presents one more urgent reason for much reflection with respect to the practicability of existing legislation relative to competition. This legislation seems to encourage, if it does not actually compel, unrestricted and warlike competition equally whether that competition is constructive and beneficial to public interest or wasteful and contrary to public interest. We may be able to recover success-

fully from the destructive influences of a great war, for when it is once over the problems of war itself no longer exist; but we may well ponder whether it is possible for the most skilled intellects and the best intentioned people to cope with the complicated problems of a social system which compels men to fight one another often on unequal terms—which contemplates an advancing civilization, confronted with one continual crisis, a state of unending civil war.

FATIGUE AS A FACTOR IN COSTS

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FOR some years past there has been a growing tendency on the part of the cost men of the country to regard the present methods of cost accumulation as near the acme of perfection as can ever be reached. Instead of a real effort on their part to analyze, step by step, the present methods, to see if each one could not be improved upon, we have had an era of phrase changing, of new names for old elements and new titles for old jobs.

If the truth of this statement is doubted let us just recall a few of these changes that have been made, viz.:

1. Productive labor is now direct labor and non-productive labor is indirect labor, simply because someone thought that the caption non-productive might jar upon the feelings of some non-producer more than indirect labor.
2. Overhead has been changed to burden—though it's the same thing.
3. Expenses now are allocated instead of prorated.
4. Systems now are very seldom installed by just a cost accountant—he must be an engineer.

And so we could go on and on while a comparison of the actual cost methods of arriving at final costs have changed very little, if any, with the exception of the advent of mechanical aids in the office such as tabulators, etc.

In fact, the fundamentals and methods of arriving at various figures are the same today as outlined by Taylor, Merrick, Barth

and others of their day and it is with this in mind that the writer has chosen the factor that perhaps is important enough to be classed as an element and about which no more is known, as far as cost procedure is concerned, than in the past, and that factor is Fatigue.

Is Fatigue Important?

Fatigue—what smiles and head shaking the very word causes amongst cost accountants of today—what crimes have been committed in thy name and what a boon it has proven to some as an alibi for slapping on all kinds of percentages and as a smooth-all to iron out the peaks and fill in the valleys. Yet it is such an important factor in costs that one writer describes it as the "great industrial disease" and states that "the cost of fatigue is not less than 20¢ per day per worker, or an annual total of more than $2,000,000,000, or four times the annual fire loss." While all writers agree that it must be taken into consideration in arriving at costs, the method to be used—that is different.

A comparison of the methods most widely used at present with those originally outlined by some of the so-called fathers of cost shows that the only changes we have made have been the elimination of certain allowances and the cutting of others without any basis for the action. The high ideals set for cost accounting in the beginning have been lost sight of. The original idea whereby the cost accountant acted as a sort of moderator between capital and labor has gone. His methods then were to bring increased wages to the employee and decreased costs to the employer, but this has been changed and the modern cost man is now always looked upon as being on the side of the manufacturer and his rates now are set with the idea of more production and less pay rather than more production and an increase in pay with the result that very little friendliness exists between the cost man or the employer, and the employee.

A careful perusal of the works of Taylor will disclose a slight discrepancy between his statement in "Principles of Scientific Management" and later results obtained, though it shows the high ideals originally set. He states "but it should be distinctly understood that in no case is the workman called upon to work at a pace which would be injurious to his health. The task is always

so regulated that the man who is well suited to his job will thrive while working at this rate during a long term of years and grow happier and more prosperous instead of being overworked."

That is quite different from conditions prevailing in most companies today but an interesting point is that in one job Taylor mentions namely—loading pig iron—the quota he set could be met and was met (with an increase in wages of about 60%), but only by one man in a crew of eight and he fails to state that any attempt was made to see if the men discharged were tried for adaptability in other lines of work.

An article in Managements Handbook by Ronald Press Co. Sec. 15—entitled "Operations Study and Rate Setting" by Jos. W. Roe & Chas. W. Style states—"certain allowances must be added in figuring the standard task. Differences between work a man can do for short times and what he can maintain is greater than realized."

In "Time Studies as a Basis for Rate Setting" by Dwight V. Merrick it is stated that "the measure of the fairness of a task is the ability of the worker to complete it consistently in slightly less than the task time."

So it can be seen from foregoing statements that fatigue is a real and important factor and with that established the next question that naturally arises is "What is fatigue" and that is what we will discuss in the following paragraphs.

What Is Fatigue and Its Cause

A government committee of Great Britain known as the Health of Munition Workers Committee defines fatigue as "the sum of the results of activity which show themselves in a diminished capacity for doing work."

An article in "Journal of Industrial Hygiene", June 1931, entitled "Subjective Side of Fatigue in Industry" by Rex B. Hersey states that "fatigue is not that tired feeling that may make a worker slow all through the day but full of pep at night" and that their investigations have shown that "the feeling of fatigue does not coincide with a lowered rate or amount of work accomplished." As a proof of this latter statement it offers the following cases:—

"James K—24 years old worked steadily 20 hours a day for a period of ten days without noting any fatigue. The day after his

return to a normal schedule he was restless and could not stay at any one job. It took him 6 months to recover.

William G. worked steady for five and one-half months without any recreation or physical exercise. When finished with that job he was unable to continue for six weeks."

The article also states "sustained boredom will lead to true fatigue even though the job only consist of setting at a machine for 15 minute periods and watching it run."

"Food Industries", Dec. 1930, contains an article by C. O. Sappington entitled "Fatigue Reduction Increases Profits" in which the author states "fatigue may come from worry and worry comes from fear." If that is true then the fear that most employees have of being laid off during these depressed times must have increased fatigue considerably. It further states that the Hawthorne Works of the Western Electric Co. in Chicago showed that "pay incentives do not stimulate production if other working conditions are wrong."

The article in Managements Handbook referred to in a previous paragraph states "lighting conditions have a great effect on fatigue and on production" and "about one-half of the sunlight which enters a room comes through the upper third of the windows."

Other causes cited by various writers are noise and proximity of department to noise, heat, drafts, variation in rhythm, avoidable delays, personal delays and machine delays, hours (daily and weekly), holidays, seasons, days of the week, weather. To these I believe should be added the location of the factory, method of transportation and living conditions.

Methods of Reducing Fatigue and the Resulting Increase in Production

Probably the most popular and effective methods of reducing fatigue are rest periods, changes in occupation, having benches and equipment at right height, and elimination so far as possible of miscellaneous causes mentioned above.

The article in Managements Handbook referred to previously states "adjustment of benches or chairs to meet individual variations is always advisable."

"Industrial Fatigue and Efficiency" by H. M. Vernon states

"rest periods increase accuracy as shown in printing establishment by increase in quality of proof readers work."

Hawthorne Works of the Western Elec. Co. report "the total daily output is increased by rest periods and not decreased."

New York *Times* of March 11, 1928 published an article stating "rest pauses lessen fatigue and increase production even though the actual working time is less." "A rest of one hour is insufficient to eliminate mental fatigue for one-half hour's intensive mental work"— "one minute's work in multiplication requires a rest period of four minutes before working capacity is restored to normal." It further states that in monotonous work such as handkerchief folding or ironing and stamping cigarette tin lids "a 10 minute rest period caused an increase of production varying from 1.5% to 8%." Four monotonous tasks had "output increased 13%, 5%, 8% and 11%, respectively, by 10 minute rest periods" and "on some jobs production increases with the frequency of pauses even though such pauses are spontaneous." For instance, one job showed that 16 pieces an hour were produced without any pauses but when working 25 minutes and resting 5 minutes they produced 18 pieces per hour, when working 17 minutes and resting 3 minutes they produced 22 pieces per hour, and when working 10 minutes and resting 2 minutes they produced 25 pieces per hour.

An article in "Engineering," April 5, 1929 written by Linden states that they believe changes in occupation have not received as much attention as rest periods although they recommend rest periods as well, but they state "there is very little or no direct information regarding the effect on output produced by uniform or varied work respectively or the limit of time for which a single operation can be continued with advantage."

A report published by the Industrial Fatigue Research Board of Great Britain and written by J. A. Fraser and S. Wyatt assisted by F. G. L. Stock on "Comparative Effects of Variety and Uniformity in Work" shows the following:—

In assembling bicycle chains it was found that by having the operators spend ½ of the morning and ½ of the afternoon on simpler operations and different operations, that output was increased 2 to 5%.

In the operation of fixing airtight lids to cigarette tins employing three operators where first person in crew did most of work, sec-

ond next and third least it was found by changing rotation several times a day that output was increased 5 to 14% with an average of 9%.

Another operation weighing and wrapping tobacco by changing from one steady task to doing one process for a period and then switching to another, production was increased on each process an average of 10% and varied from 5% to 25%.

The authors suggest "for light repetition work the rate of production is smaller and less regular with uniform than with varied tasks and attains maximum at 1½ hours to 2 hours of unvaried work but too frequent changes with loss of rythm will depress output" and "apparently changes should be more frequent as the work is fatiguing and the alternative occupation should be markedly different from that for which it is substituted."

F. W. Taylor in his "Principles of Scientific Management" advocates and shows the benefit of fixed rest.

Merrick in his book referred to previously advocates rest periods "either distinctly as such or under the guise of non-productive jobs" such as moving finished production from bench or machine to next position, going for raw material, etc., and the interchanging of operators on machines with similar operations.

Other writers mention that the failure to recognize and remove fatigue as far as possible has a direct bearing on the number of accidents and creates a desire for intoxicants while a spinning mill increased efficiency 15% by the introduction of 10 minutes rest spells and reduced labor turnover from 250% to practically nothing. Another publication reports "production increased considerably and errors lessened when assembling room was moved away from boiler shop," and "production increased 12% when noisy fan was stopped."

Method of Including Fatigue Allowance in Time Studies

In the previous chapters we have endeavored to establish first, that there is fatigue, second, its cause and description, and third, its reduction as far as possible. In speaking of fatigue henceforth it will be understood that this fatigue is the amount remaining after all corrective measures have been applied.

However in subsequent formulae given, the resulting answer is not the fatigue factor alone but a conglomeration of allowances

for fatigue, variation in rhythm, inavoidable delays, personal delays, machine delays, etc., and the term applied is "variation allowances."

"Scientific Management in American Industry" by the Taylor Society, in Chapter VII, "Research for Production" by Geo. D. Babcock, the author states "the fatigue factor in the allowance depends chiefly upon two factors in the mechanical nature of the operation—the length of the operation cycle and the relation of handling time (when the worker is doing manipulative work) to machine time (when the machine is working without worker manipulation)."

Dwight V. Merrick in "Time Studies as a Basis for Rate Setting" states "time study is necessary if the best results are to be obtained from every worker and not from a few selected workers of unusual skill."

Naturally the first question that occurs is "what is time study" and his definition for that is "time study measures his production ability, teaches him how to work in an easy and efficient manner and then, and only then, sets a task."

Writing directly on fatigue Mr. Merrick states "the only approved method of arriving at the information necessary to establish fair and equitable fatigue and delay allowances, however, is to carry on exhaustive and comprehensive production studies as a part of the time study routine, analyze the data secured and deduce definite allowances therefrom."

Reference is made to probably the first formula used for allowances as devised by Carl G. Barth and is as follows:

$$P = \frac{125}{1.20 + \sqrt{T}} + 20$$

P = % by which minimum selected time is increased

T = minimum selected time.

The method approved by Merrick and generally used is to use curves obtained from many sources for each broad classification of work viz., machinists, foundry workers, etc., and to have these curves designated by the percentage the minimum selected handling time is to the minimum selected time of the cycle. For instance, if the total minimum selected time of a cycle is 1.50 minutes and the handling time is .75 minutes then the curve used

would be designated as 50% or something similar inasmuch as that is the percentage the handling time is to the total and the allowance is figured on that basis.

For the multitude of curves that have been made the following somewhat complicated formula has been devised.

$$P = 20 + \frac{49.5 - 0.325\,C}{\sqrt{0.376 - 0.0000\,216C^2 + T}}$$

P = % of allowance
C = % of handling time
T = minimum selected time for cycle

In speaking of allowances it is interesting to note that the following has been set in italics : *"it is not expected that an operator will attain the minimum time—except under unusual circumstances."*

Conclusion

In comparing the formulae given previously with the statements of various writers it becomes evident that while certain high ideals were formed in the beginning the formulae themselves have not given the same consideration to the problem and the writer agrees with the statement made by others that no formula can be devised that will apply to all cases when all angles are considered.

The addition of arbitrary allowances to a time study that has been timed to a hundredth of a minute and finer has been deplored by many writers but the practice still continues with apparently no effort to improve. The inconsistency of statements made with practices emphasizes the point as well.

For instance, Merrick in his book after making many statements regarding fair allowances (some of which have been mentioned here) gives an example and shows the addition of an arbitrary allowance to preparation time "to offset any variation interference, etc.," of 25% and "to the total of working cycle time and preparation time a flat shop allowance of 2½% is added to cover oiling the machine and washing at noon and night."

There seems to be very little tieing-in between the medical profession's findings in regard to muscular reaction on frogs, etc., and the accountants' viewpoint or knowledge of the human body's

capacity beyond which it is harmful to drive a man. Numerous tests have shown that a multitude of things affect an employee's capacity but still no attention is paid to most of them.

In the references given it was plain to be seen that rest pauses are nearly the unanimous suggestions of the writers and still how many places have reduced their rates to such a point that there is no time for rest? In fact if the employee is caught resting he is accused of soldiering and discharged. Inquiries among time study departments in various factories show very little attention paid to time of day when study is taken. Machine delay has been dropped from the allowances and the operator earns nothing while the machine is down and it seems to be growing more popular among cost men each year to make the base time the basis for the rate and compel the operator to try to beat it.

Some of our largest systematizing companies in the country, national in scope, will still install a cost system which they tell you is fair to the workman and yet the allowances added were obtained from charts and based on past experiences and no attempt is made to verify it in the factory in question.

It seems to the writer that until the cloak of mystery that the modern systematizer or rate setter tries to throw over his allowances has been torn asunder, that until allowances are arrived at on the basis of each job within each factory and within each department, that until the limit of the human body is recognized the cost accountant must realize that he is responsible for a man's being burned out at 40. It is his duty to stand upon his feet and oppose any quota that will force any operator beyond the fatigue point and feel confident that by so doing he is helping production, not hindering it.

SUGGESTED BIBLIOGRAPHY

WAGE STABILIZATION:

N. A. C. A. Publications:

Determination of Labor Standards for Cost and Wage Incentive Plans, The. 1928 Year Book, pp. 41-93.

Group Bonus and Labor Standards. Bulletin I, April 16, 1927. (out of print.)

Methods of Wage Payment as Related to Costs. 1923 Year Book, pp. 43-86. (out of print.)

System of Labor Control for Payroll and Cost Purposes, A. Bulletin I, Sept. 1, 1925. (out of print.)

Basis for Wage Incentive Plans. Bulletin I, April 1, 1930.

Profit Sharing as a Method of Compensation. Bulletin I, Feb. 2, 1925.

Premium Incentive Wage Plan, A. Bulletin I, April 1, 1922. (out of print.)

General:

Report of Wage and Personnel Survey, Field Survey Division. U. S. Personnel Classification Board, Washington, D. C., 1929. 511 pp.

Group Incentives by C. C. Balderston, 1930. xi. 171 pp. Industrial Research Department, Wharton School of Finance & Commerce, Universty of Pennsylvania, Philadelphia, Pa.

The Problem of Pensions, by A. W. MacDonald. Personnel, May, 1929. pp. 11-17, American Management Association, 20 Vesey Street, New York, New York.

Pensions. Fundamentals in the Development of Pension and Other Retirement Plans. 1929. 54 pp. U. S. Chamber of Commerce, Dept. of Manufacture, Washington, D. C.

Managerial Profit Sharing by C. C. Balderston. 1928. xiii, 127 pp. John Wiley & Sons, 440 Fourth Avenue, New York, N. Y.

Wages, Salaries, Fees, Pensions, by George W. Vary—American Management Ass'n, General Management Series, No. 89.

Wages, Fees, Etc.—Profit Sharing by R. E. Heilman. American Management Ass'n, Production Executives' Series, No. 8.

Fatigue:

Scientific Management in American Industry; edited by H. S. Person, c. 1929. 479 pp., Harper & Bros., 49 East 33d Street, New York, N. Y.

Time and Motion Study No. 14—(General Series No. 5) 1921. Industrial Fatigue Research Board—H. M. Stationery Office, Imperial House, Kingaway, London, W. C. 2.

Food Industries, Dec., 1930. McGraw-Hill Pub. Company, 330 West 42nd Street, New York, N. Y.